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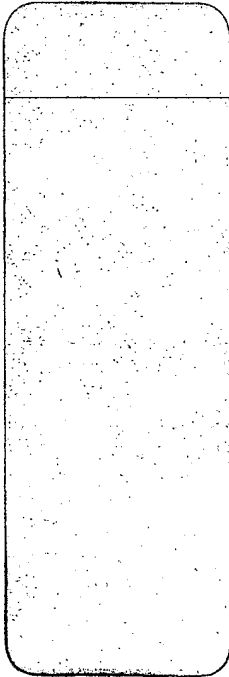
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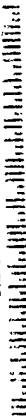
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/656,116	09/08/2003	Chien-Hsin Yang	PO92289	7047

7590 06/27/2005  
Yi-Wen Tseng  
509 ROOSEVELT BLVD. #D306  
FALL CHURCH, VA 22044

EXAMINER

KNAPP, JUSTIN R

ART UNIT PAPER NUMBER

2182

DATE MAILED: 06/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

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# Office Action Summary

Application No.

10/656,116

Applicant(s)

YANG, CHIEN-HSIN

Examiner

Justin Knapp

Art Unit

2182

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 08 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-6 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 September 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- 1) ☐ Certified copies of the priority documents have been received.
  - 2) ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

2. Claims 1, 2 and 5 are rejected under 35 U.S.C. 102(a) as being anticipated by the Matrix Orbital MX214, reviewed by Miguel,

<http://web.archive.org/web/20030821012752/www.extremhz.com> (herein referred to as Miguel).

3. As per claim 1, Miguel teaches:

a microprocessor (it is inherent that the Matrix Orbital has processing circuitry);

a first input connection, connected to a system management bus of a motherboard of the computer to obtain operation temperature, operation voltage and fan rotation speed of the computer (see Features section, temperature probes are used to obtain various temperatures and fan headers are used to obtain fan speeds);

an erasable memory, controlled by the microprocessor to store default values of operation temperature, operation voltage and fan rotation speed (see Specs section, memory chip saves settings);

a display screen, controlled by the microprocessor to display the operation temperature, operation voltage and fan rotation speed obtained by the first input connection (see Specs section, an LCD display is used to display various settings); and

Art Unit: 2182

an operation panel, comprising a display light and a plurality of buttons, controlled by the microprocessor to input the default values of operation temperature, operation voltage and fan rotation speed, wherein when the operation temperature, operation voltage and fan rotation speed obtained by the first input connection exceeds the default values, the display light generates a warning signal (see The Display section, Operation panel comprises several buttons and a display light).

4. As per claim 2, Miguel teaches wherein microprocessor is operative to control rotation speed of a fan in the computer to control operation temperature of the computer (it is inherent the Matrix Orbital must have processing circuitry to interact with obtaining and controlling of fan speeds).

5. As per claim 5, Miguel teaches wherein the display light includes an LED (see Features section).

### *Claim Rejections - 35 USC § 103*

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miguel in view of Tanenbaum, Structured Computer Organization 3<sup>rd</sup> Ed. Miguel does not explicitly teach further comprising a second input connection connected to a debug port of the computer, the second input connection being controlled by the microprocessor to obtain a debug code when an error

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operation of the computer occurs, and to display the debug code on the display screen in a desired language. However, Miguel does teach of bundled software called LCDC that performs these functions. Tanenbaum teaches that hardware and software are logically equivalent. Any operation performed by software can be built directly into the hardware and any instruction executed by the hardware can also be simulated in software (see page 11). Using the teachings of Tanenbaum within the apparatus of Miguel, it would have been obvious to one of ordinary skill in the art to create a second input connection to a debug port in hardware in place of the software that performs the same functions. Doing so would be more cost efficient and increase the speed of the apparatus.

8. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miguel. Miguel does not explicitly teach the erasable memory includes an electrically erasable read only memory. Miguel does teach a memory chip used to save settings. It would have been obvious to one of ordinary skill in the art to utilize an electrically erasable read only memory to save the system settings in the apparatus of Miguel as this type of memory is extremely well known in the art for its programmability functions.

9. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miguel in view of Kennedy, Super Cooler System Monitor, [www.tweak3d.net/reviews/amk/e2c](http://www.tweak3d.net/reviews/amk/e2c). Miguel does not explicitly teach the operation panel further comprises a speaker to generate an audio warning signal when the operation temperature, operation voltage and fan rotation speed exceed the default values. Kennedy does teach an audible overheat alarm/warning system in a similar monitoring apparatus. It would have been obvious to one of ordinary skill in the art to utilize the

audible alarm taught by Kennedy within the apparatus of Miguel as it would provide an additional feature to the apparatus making it more marketable.

### *Conclusion*

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Applicant is reminded that in amending in response to a rejection of claims, the patentable novelty must be clearly shown in view of the state of the art disclosed by the references cited and the objections made. Applicant must also show how the amendments avoid such references and objections.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Justin Knapp whose telephone number is (571)272-4149. The examiner can normally be reached on Mon - Fri 8:30 am - 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dov Popovici can be reached on (571)272-4083. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Application/Control Number: 10/656,116  
Art Unit: 2182

Page 6

A handwritten signature in cursive script, appearing to read "Justin Knapp".

Justin Knapp  
Examiner  
Art Unit 2182

June 23, 2005

<b>Notice of References Cited</b>	Application/Control No. 10/656,116	Applicant(s)/Patent Under Reexamination YANG, CHIEN-HSIN	
	Examiner Justin Knapp	Art Unit 2182	Page 1 of 1

**U.S. PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
	A	US-2002/0152406	10-2002	Watts et al.	713/300
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

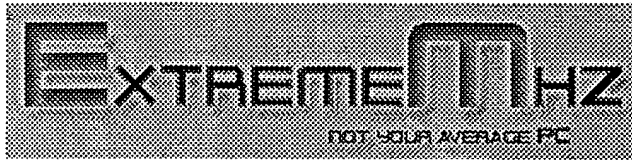
**FOREIGN PATENT DOCUMENTS**

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

**NON-PATENT DOCUMENTS**

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	Matrix Orbital MX214, <a href="http://web.archive.org/web/30020821012752/www.extrememhz.com/mx214-p1.shtml">http://web.archive.org/web/30020821012752/www.extrememhz.com/mx214-p1.shtml</a> , Aug 2002
	V	Super Cooler System Monitor, <a href="http://www.tweak3d.net/reviews/amk/e2c">http://www.tweak3d.net/reviews/amk/e2c</a> , July 1999
	W	Tanenbaum, Structured Computer Organization 3 <sup>rd</sup> Ed, pages 11-13, 1990
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



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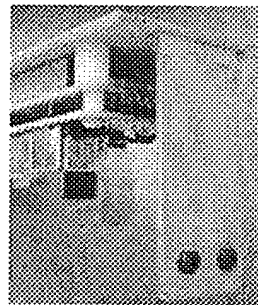
## Hardware Installation

The Case Gallery

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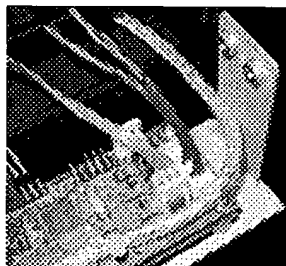
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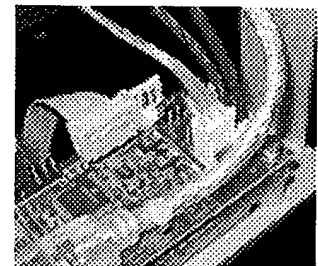
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Installing the display is quite simple. The PC Bay Inserts are made of high quality metal and conveniently include the mounting screws.

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Before mounting the bay on the case, you may want to connect any of the optional accessories you may have purchased along with it. The temp probes are easily attached to the WOL headers and fans with 3pin power connectors can be plugged into the available fan headers. The maximum current is ~1000mA at +12Vdc from the fan headers. The LED Indicator Bus cable connects to the pins near the white power connector as shown above. The red strip should be facing the white header.

## Software Installation

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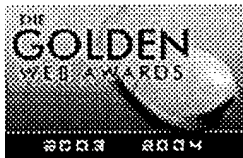


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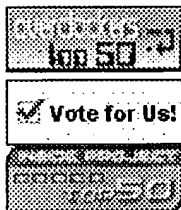


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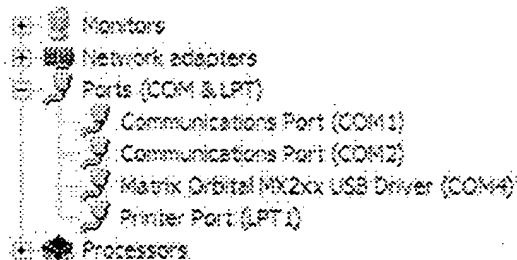


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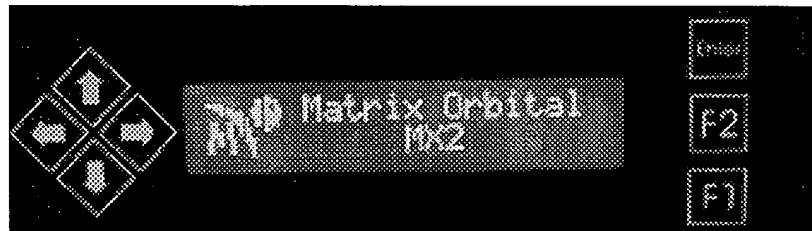
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In a windows XP system, the MX2 is quickly identified and the Found New Hardware Wizard will pop up. The driver for the display is included in the mini CD and you'll simply need to choose advanced and browse to the driver directory to finish the installation.



The display will be shown under Ports and USB in your Device Manager. You can verify the COM port the device is using from here so you can setup the display correctly in LCDC.



If all is well, you should see the cool default Matrix Orbital splash screen as shown above.

**Note:** Something worth mentioning is that this new model completely turns off when your shutdown your PC. Previous MX2 models would remain on even after shutdown.

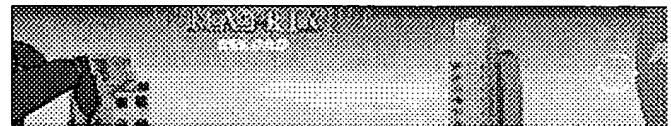
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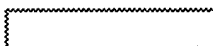
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## Reviews

### Matrix Orbital MX214 - The New & Improved MX2

Model: MX214

Manufacturer: [Matrix Orbital](#)

Reviewed By: [Miguel](#)

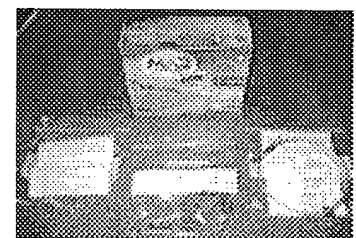


This is our fourth Matrix Orbital display review. Their excellent features, performance and reliability earned them all our highest recommendation. After reviewing the excellent MX2 LCD module, we just couldn't see how they can possibly make them any better. We'll they have, and in a big way! This improved model is loaded with amazing new features and is said to included a more user friendly version of LCDC. We got our hands on one from Matrix Orbital and we'll be putting it to the test as well as point out all the added new features.

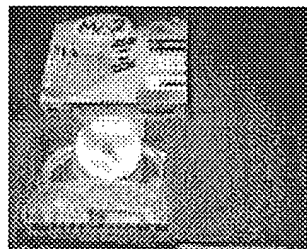
## Contents



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The unit came in the usual white box we are now quite familiar with. The surprise was what was inside. This improved version of the MX2 now comes in a nice box with a mini CDR containing drivers and software. We also received a bunch of extra goodies which we will look at in detail in a bit. These include an internal USB cable, an LED Indicator bus and some temperature sensors. We knew we were in for a real treat!

## Specs

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## **Includes**

- USB LCD Display with wide voltage (20 characters x 2 lines) - Product # LK202-24-USB
- 7-key keypad overlay, bracket, USB cable, and mounting screws
- Software and manual on CDROM
- LCDC!!!

## **Interfaces**

- Interface with up to 24-key keypad
- Use 3 General Purpose Outputs
- USB communications (Connect up to 100+ displays)

## **Functional Capabilities**

- Display text, horizontal and vertical bar graphs
- Software controlled speed, start-up screen, line wrapping, scrolling, contrast, backlight and time-out setting (up to 180 minutes)
- Memory chip saves settings
- Custom start up/splash on screen

## **Speed**

- USB mode: 1200bps to 19.2 Kbps
- Fully buffered - no delays in transmission

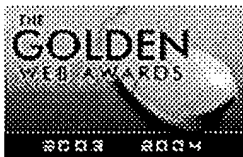
## **Power Requirements**

- Operates at 0°C to +50°C
- Supply Voltage: 5Vdc
- Supply Current: 25mA typical
- Backlight Supply Current: 115mA typical

**Next: Feature:**

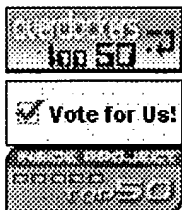
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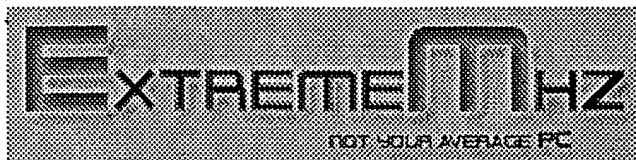


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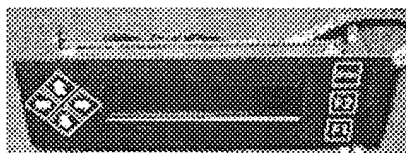
## Reviews

### Matrix Orbital MX214 - The New & Improved MX2

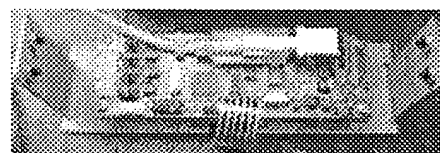
#### Features

The new and improved MX2 is loaded with great new features. Let's have a closer look at them.

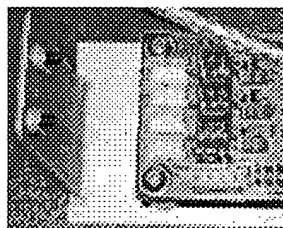
#### The Display



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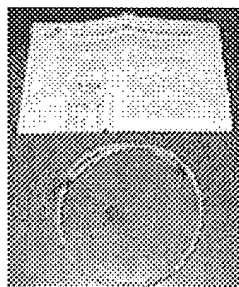
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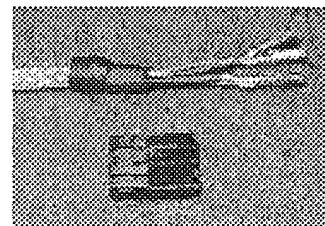
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The front of the display does not look any different than the original MX2. The PC Bay inserts are now available in black, beige and brushed aluminum. It's when we turn the display over that we reveal some new connectors located on one side of unit. There are three fan headers which will allow you to have more control of your fans and four connectors that can be used for temperature monitoring.

#### Optional Internal USB cable



[\\*\\*click to enlarge\\*\\*](#)



[\\*\\*click to enlarge\\*\\*](#)

You can now use an internal USB cable rather than the included external cable to hook up your display. The cable is nice and thin and will eliminate cable clutter. One end of the cable has bare leads but the package includes that second black

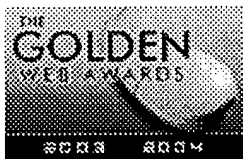
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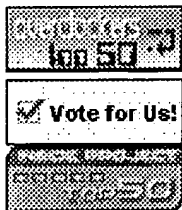
  
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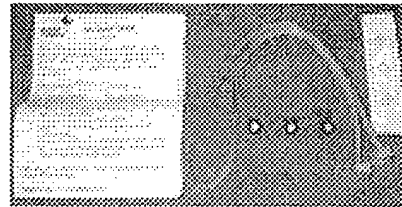


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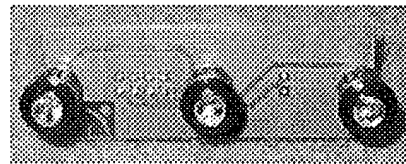
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header. There is a reason it ships this way. The pinout of your USB headers may vary by motherboard manufacturer. You will first need to determine the pinout orientation before attaching the included header. Connecting it internally is optional and this is mainly for advanced users who would like to eliminate additional cable clutter. The package comes with very good detailed instructions but if you go this route, it is important that you are certain as to how it should be connected to prevent the display from being damaged.

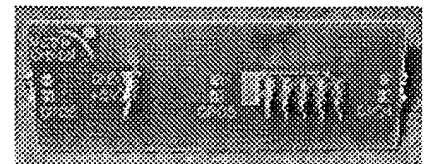
## Optional Indicator LED Bus



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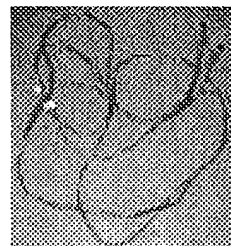
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You can now connect an optional Indicator LED bus to the MX2 which will allow you to enhance its functionality and appearance. This accessory will allow you to have visual indications from LCDs based on a given event such as low hard drive space, new email, etc. The package includes instructions and a drill template to be able to mount the bus on your case. Again, this is optional, but if you decided to install it, you will first need to find a good place to mount it and you will need an 8mm drill bit for the holes. Also included is the cable which is easily attached to the back of your MX2 display. A very nice addition which we will be testing a bit later in this review.

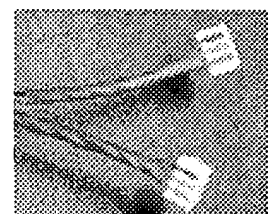
## Temperature monitoring and probes



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[\\*\\*click to enlarge\\*\\*](#)




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One of the best new features is the ability to use the display to monitor temperature using temp probes instead of relying with software like Motherboard Monitor. Those four white connectors on the back of the MX2 can be used to connect these optional temperature probes, allowing you to monitor temperatures without having to go through software like Motherboard Monitor. The connectors and cables are the same used in Wake on LAN (WOL) cables. The temp probes look quite different than those unreliable flat ones we are used to seeing. These are said to be highly accurate and you can connect up to four, giving you plenty to monitor.

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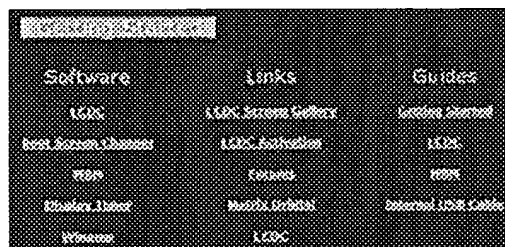
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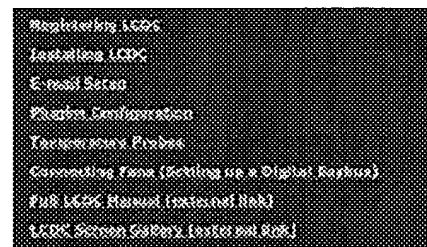
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## Matrix Orbital MX214 - The New & Improved MX2

### Bundled Software



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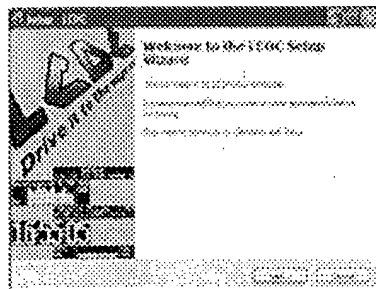


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The mini CD includes a web-based interface that contains everything you need including the bundled software applications, help topics and guides.

### LCDC

Our display came bundled with LCDC version 1.05 build 26. This is said to be an improved version of LCDC that is more user-friendly. We have had problems with previous versions so we hope there is an improvement.



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**\*\*click to enlarge\*\***

Installation is simple and a window will popup finding all available displays and allowing you to optionally setup a default pattern of sample screens to use with the display.

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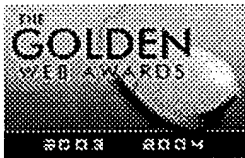


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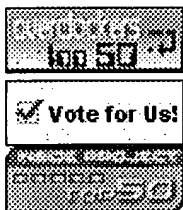


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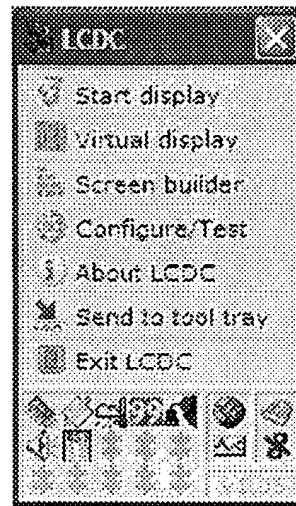
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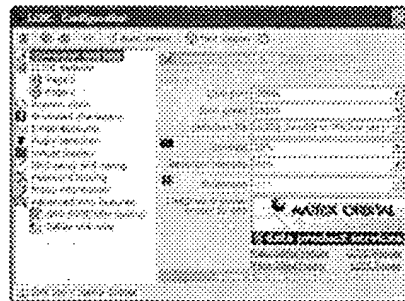
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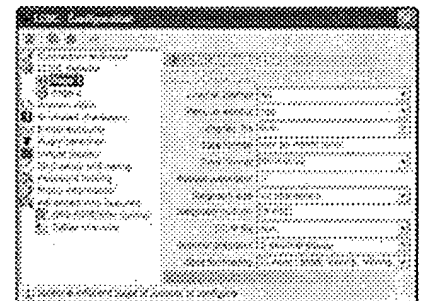
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Just like the previous versions, you have you small menu window where you can stop/start your display, configure and test your display and build your own custom screens. From here, you will also be able to view available plug-ins and whether or not they are active or inactive.

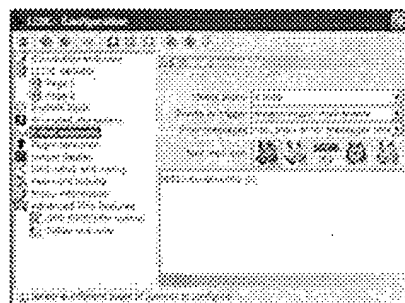


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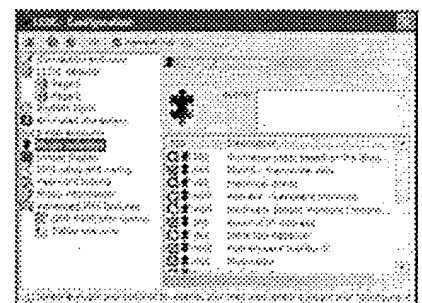


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There is a nice Auto Detect feature in the configuration start screen that does a good job and detecting your display, simplifying setup. Brightness and Contrast adjustments can be made from here as well. You also have access to the program configuration settings from this section.



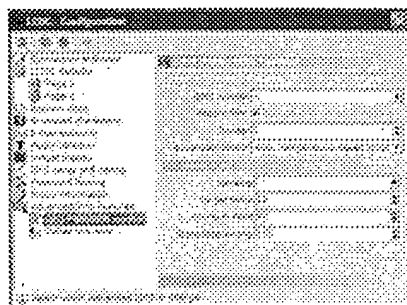
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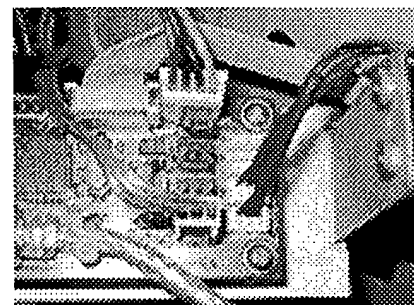
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LCDC can be used as an email checker as well. You can setup multiple accounts and check them at a specified interval. Unfortunately, the lowest you can go is every 5 minutes. I always prefer to have my mail checked every minute so we hope that a future build will allow you to do so. We liked the option that is available to change the sys tray icon when new mail is available. You have five icons to choose from. The plugin section will display all available plugins and you can select or deselect any of the pre-installed ones.

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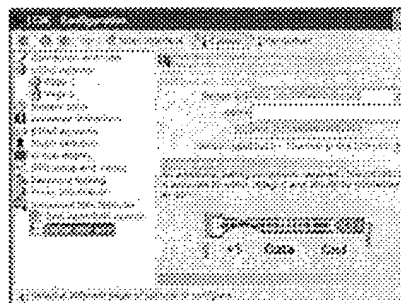


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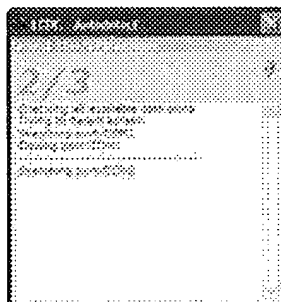


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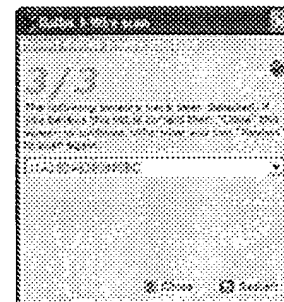
Also new in LCDC is support for the advanced features of the new MX2 display. These include fan control and temperature monitoring. In order to use the fan headers to power your fans, you'll need to make sure you run the display in high power mode and connect a floppy power connector to the white power header on the back of your display. The jumper to run on high power is right above the power header as shown above. It will probably already be set this way so you will only need to connect the floppy power cable to the display. We connected a 3 pin fan to one of the headers and played with the fan control settings to see if it would run the fan at lower speeds. This new feature worked well and we were impressed both with the display and software. The only thing I found is that sometimes it would momentarily stop the fan when the system was restarted. Not sure if there are additional settings that need to be made to prevent this, but my recommendation is use this feature with your case fans only. Do not plug your CPU fan to one of the headers. It is always a good idea to maintain your CPU fan at its normal operating speed at all times. Overall, we were very impressed with this new RPM control feature.



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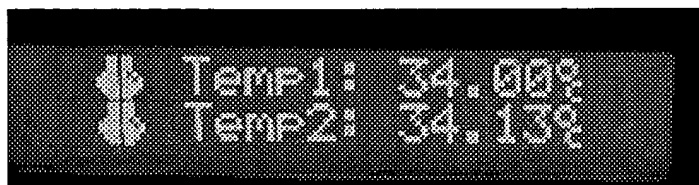


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**\*\*click to enlarge\*\***

The second window in the advanced features section will allow you to setup your optional temp sensors. We loved how you can have LCDC scan the interface for any sensors you may have plugged in. It quickly detected the two sensors we plugged in two of the four available headers. From this menu, you also have the option of displaying the temps in Celsius or Fahrenheit.



Once you have them setup, you can then go and build a screen and grab the two sensors to display. You can even add some cool custom characters to display graphics. Above is one of the screens we created to display the temps from the two temperature probes we connected to the MX2.

We were very impressed with the software support for these advanced features.

### Other Software

Below are a list of other software and utilities available on the CD:

Boot Screen Editor: Allows you to change the default start screen that's programmed on your display.

Display Tuner: Allows you to fine tune your display even further

Motherboard Monitor: A great hardware monitoring utility.

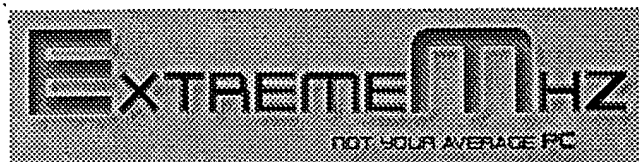
Winamp: The popular MP3 player we have all used at least once.

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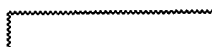
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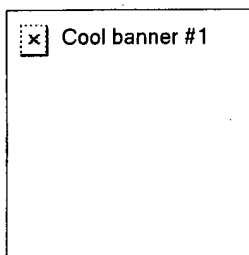


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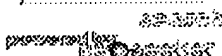
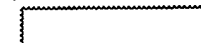
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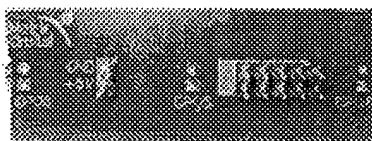


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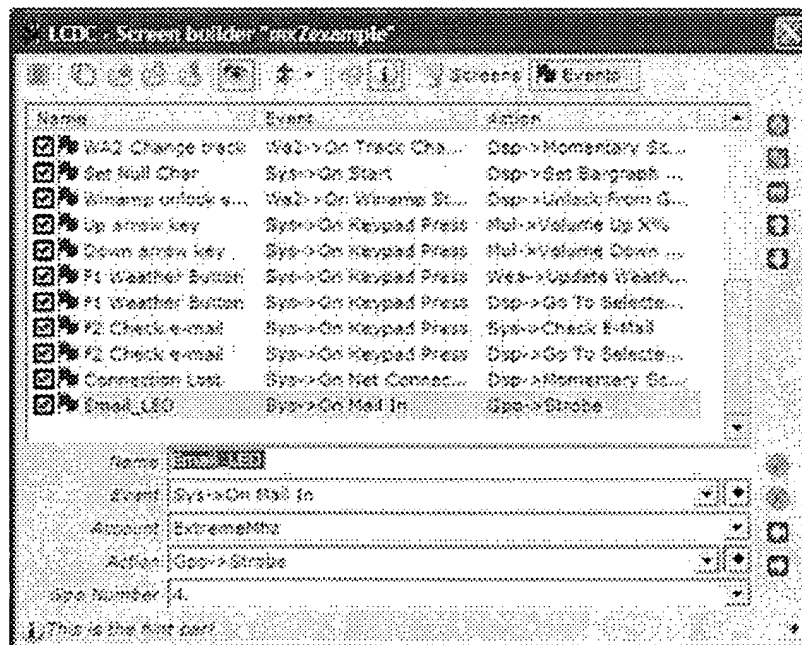
## Matrix Orbital MX214 - The New & Improved MX2

### LED Indicator Bus



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The LED Indicator Bus was the most difficult to get working but was definitely the most fun once we did! They don't include detailed instructions as to how to set it up in LCDC. Turns out we were using the wrong GPO number! I did not bother to look at the back of the LED bus which clearly marks each LED as GPO 04-06 as shown on the pic above. When you setup an event in LCDC, you have to select one of these in order to get it to work. Those who are not already familiar with the functionality of these displays may find it a bit difficult to get this accessory working. We will show you one example in which you can use this accessory.



We setup the LED labeled "GPO 04" to turn on, flash or strobe when new email is present. To do this, open the screen builder in LCDC and click on the "Events" tab. From here, you will create a new event and give it a name. Select "Sys -> On Mail In" from the Event menu. Under accounts, select one of the email accounts you setup in the configuration menu. As the Action, select GPO to strobe, flash or turn on.

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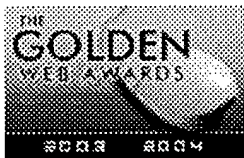


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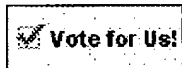


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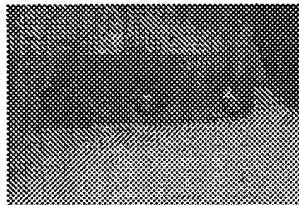
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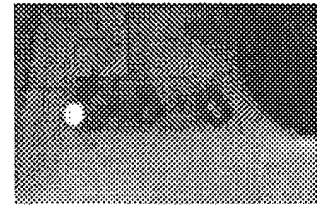
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Make sure you select the correct GPO number!



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 strobe effect video clip

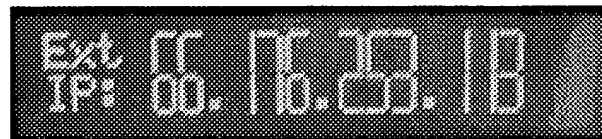
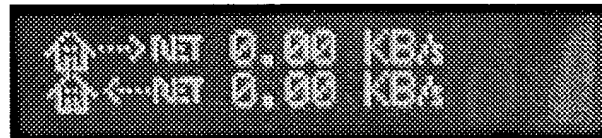


\*\*click to play\*\*  
 blink effect video clip

The LED bus uses high intensity blue LED's. I love how you can set an effect to each LED individually in LCDC. Above are two 8 second video clips to demonstrate both the strobe effect and flash effect.

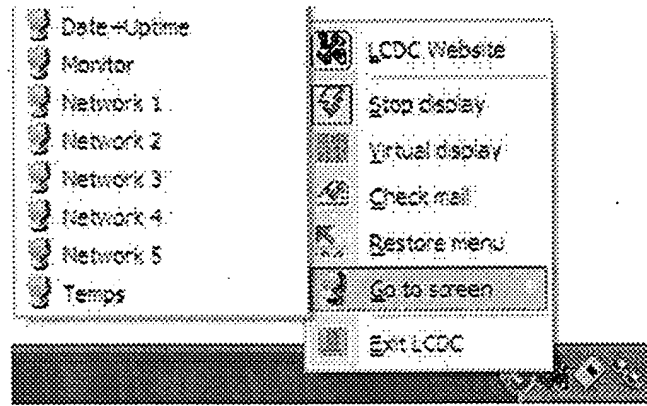
## Sample Screens

What we did like with this new version of LCDC was some of the cool pre-installed screens. Most of them are quite useful and save you the time it takes to create them yourself. Below are just a few that come pre-configured for you.



Another great feature is the ability to access any of your screens on demand from the right click menu of your LCDC sys tray icon as shown below.

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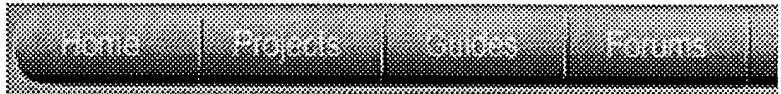


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## Reviews

### Matrix Orbital MX214 - The New & Improved MX2



## Conclusion

Matrix Orbital has impressed us once again with their new feature rich MX2 series display. The advanced features worked well and provide hours of fun. The new and improved MX2 is more than just an LCD display, it is an expandable unit which offers various add-ons to satisfy even the most demanding PC enthusiast. The temp sensors work well and the LED bus is a nice functional add-on accessory that can be quite entertaining and can make your case a bit more unique and appealing. The fan headers and RPM control worked well, however, there were times when the fan momentarily stopped during a reboot.

We were quite impressed this time with the included version of LCDC. We loved its solid support for the add-on accessories and all the pre-configured screens. We did not necessarily find it more user-friendly, but did find some of its new features quite enticing. It can still be a challenge for novice users to configure screens and create events. Unfortunately, it is still not as stable as we would like it to be. We still experienced some hangs during the screen building process. But that is understandable considering all the support and features that have been added. We hope to see a more stable release in the near future.

### Pros

- Excellent performance
- Expandable
- Temp monitoring via sensors
- Fan RPM control
- Internal USB cable
- Great software support
- Bezels to match your current setup

### Cons

- Can be difficult to configure screens
- Detailed instructions for LED Bus not included

Once again, the new and improved MX2 display has earned our highest recommendation.



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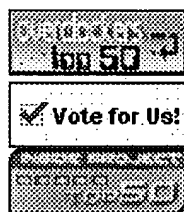
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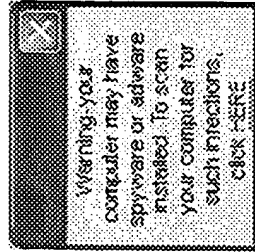
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## Super Cooler System Monitor (Page 1/1)



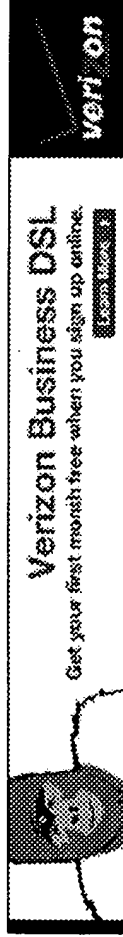
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Posted: July 12, 1999

Written by: Dan "Tweak Monkey" Kennedy

Estimated retail price: \$49.99 (Canadian) controls up to two sensors.

\$59.99 (Canadian) controls up to eight sensors.

\$5.00 (Canadian) for each extra temperature probe.

Wouldn't it be really cool if you could monitor the temperature of your video card, CPU, hard drive(s), motherboard, and sound card at all times? How about if the device that monitored these items had a built in clock, heat alarms, and two powerful fans to cool your hard drive? This kind of device would be a dream for overclockers, or anyone that is really careful about the heat their system produces. But wait - this isn't a dream; it's a reality! AMK Computers has these puppies for sale. They sure sound like a great idea.. but they cost a pretty penny. Are they worth it?

### Features

- Audible overheat alarm / warning system.
- Two fans for hard drive cooling, which can be configured to turn on or off when the heat increases.
- Up to two (or eight, if you pay for the better model) channels of temperature detection.
- Backlight on device allows you to easily see the display in the dark.
- Built in clock.
- Comes with: two temperature probes, heat resistant tape for mounting probes, battery, power connector/splitter, installation manual.

### Installation

- Crucial Ballistix PC3200
- Nokia 6600 smart phone
- Mad Dog 52x24x52 CDRW
- Logitech MX Duo
- DLink USB 2.0 hubs
- Sapphire 9800 Pro U.E.
- Compex Wireless Network
- Sony P232W LCD
- Intel Pentium 4C
- Compex P52216 Switch
- Xoxide LL Warrior Contest

You can probably imagine that installing something like this would be a difficult task. Actually, it's very easy to install. First you have to open up a bay to put the cooler in. Then you need to attach all the necessary temperature probes and power connector. Next you just slide the device into a 5 1/4" bay (usually in front of a hard drive), and screw it in. Finally, you attach the power connector and then tape the probes to whatever devices you want. I taped one onto the back of my TNT2 (underneath the chip) and the other on my Pentium II 450 CPU. I ended up simply attaching the probe to my SEC (Single Edge Contact) cartridge because I couldn't find a way to get an accurate reading of the CPU without removing it. Some more probes would have been nice though...

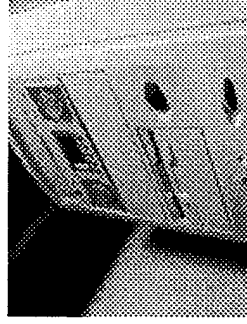
Once you have done all of this, setting the alarms and clock is an easy process. The included installation manual describes how to configure and use all of the features. After turning on your PC, the device will light up with a backlight similar to Indiglo watch lights. It can easily be read even in a very dark room.

## Observations/Opinions

### Test System

Pentium II 450  
 ABit BX6 motherboard  
 128 MB PC100 SDRAM  
 TNT2 Ultra reference board (150 MHz core / 183 MHz memory)  
 19" Optquest V95 monitor  
 VSYNC disabled  
 Creative Labs Sound Blaster Live! Retail  
 Windows 98

The cooler looks slick. It does add a nice touch to your case, and believe me, it does a great job of monitoring temperatures. With the push of a button, it goes from my CPU to my TNT2 Ultra. After a few hours of Q3Test and Kingpin, my CPU's cartridge was up to 105F and my TNT2 Ultra's back side was all the way up to 113F. If I was overclocking my TNT2, this would be a great device to help me know when things are getting too hot. This is what the cooler looks like in my case:



Another reason I really like this cooler is because of the light-up feature. It's very handy because I'm usually working at night, in the dark. Now I've got a clock and a temperature monitor that I can see at all times even if my monitor is off or very dark. Here's a picture of the cooler with the lights off:

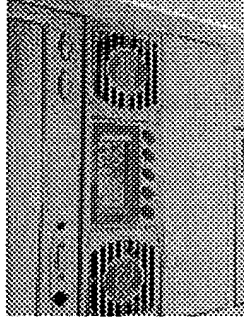
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### How To...

- Build a PC
- Case Cooling/Cutting
- Clean a PC
- Dual Boot Win2k/9x
- Get Started w/ Linux
- Get Great Deals



I really like the look of this cooler. I guess I'm a sucker for buttons, too. The buttons are esc, mode, up, down, and fan. The esc button will return the original menu, the mode button will switch between set clock, alarm, Fahrenheit/Centigrade, etc. The up and down buttons are used to set the clock or to choose between which device (up to 8 in this case). The fan button will turn the fan on or off. It's practically silent so I leave it on at all times. Here's yet another shot; this one is a close-up. If you look carefully you can read the time (12:22 AM) and the temperature of my Pentium II cartridge (103.2F).



## Conclusion

Whether you're overclocking your system or just nervous about the amount of heat your system is producing, cooling devices and temperature monitors are always a wise investment. I fully recommend this product to someone looking to spice up their system. It doesn't just look cool, it has several purposes. The clock, cooling, and temperature monitor features are definitely very useful and I think everyone would agree with me that this is an excellent product that would go great with any computer.

### [+ ] Good

- Slick design looks nice and spices up your case.
- Cools hard drives and case well.
- Monitors the temperature of several devices at a time.
- Programmable alarms warn of danger.
- A built-in clock adds yet another useful feature.
- Light-up panel allows you to see the display in the darkest of rooms.

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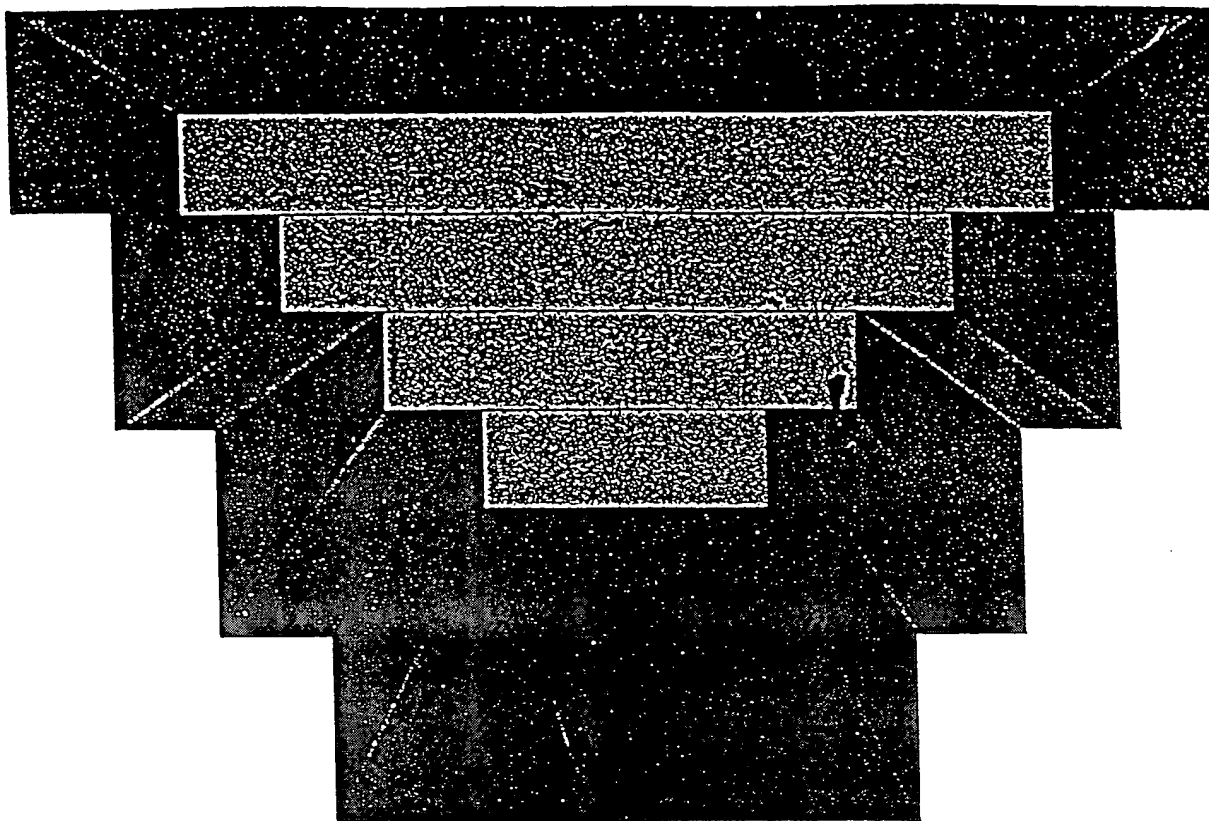
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## Overall Rating: 9.2

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# STRUCTURED COMPUTER ORGANIZATION

THIRD EDITION

*Hardware Vs Software*

ANDREW S. TANENBAUM

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## 1.4. HARDWARE, SOFTWARE, AND MULTILEVEL MACHINES

Programs written in a computer's machine language (level 1) can be directly executed by the computer's electronic circuits (level 0), without any intervening interpreters or translators. These electronic circuits, along with the memory and input/output devices, form the computer's hardware. Hardware consists of tangible objects—integrated circuits, printed circuit boards, cables, power supplies, memories, card readers, line printers, and terminals—rather than abstract ideas, algorithms, or instructions.

Software, in contrast, consists of algorithms (detailed instructions telling how to do something) and their computer representations—namely, programs. Programs can be represented on punched cards, magnetic tape, photographic film, and other media but the essence of software is the set of instructions that makes up the programs, not the physical media on which they are recorded.

An intermediate form between hardware and software is firmware, which consists of software embedded in electronic devices during their manufacture. Firmware is used when the programs are rarely or never expected to be changed, for example, in toys or appliances. Firmware is also used when the programs must not be lost when the power is off (e.g., when the doll's battery runs down). In many computers, the microprogram is in firmware.

A central theme of this book that will occur over and over again is:

*Hardware and software are logically equivalent.*

Any operation performed by software can also be built directly into the hardware and any instruction executed by the hardware can also be simulated in software. The decision to put certain functions in hardware and others in software is based on such factors as cost, speed, reliability, and frequency of expected changes. There are no hard and fast rules to the effect that X must go into the hardware and Y must be programmed explicitly. Designers with different goals may, and often do, make different decisions.

On the very first computers, the distinction between hardware and software was clear. The hardware carried out a few simple instructions, such as ADD and JUMP, and everything else was programmed explicitly. If a program needed to multiply two numbers, the programmer had to write his own multiplication procedure or borrow one from the library. As time progressed, it became obvious to hardware designers that certain operations were being performed frequently enough to justify constructing special hardware circuits to execute them directly (to make them faster). The result was a trend toward moving operations downward, to a lower level. What had previously been programmed explicitly at the conventional machine level was later found below it in the hardware.

With the coming of age of microprogramming and multilevel computers, the reverse trend also became apparent. On the earliest computers there was no doubt that the ADD instruction was carried out directly by the hardware. On a

microprogrammed computer, the conventional machine level's ADD instruction was interpreted by a microprogram running at the bottom level and was carried out as a series of small steps: fetch the instruction, determine its type, locate the data to be added, fetch the data from memory, perform the addition, and store the result. This was an example of a function that moved upward, from the hardware level to the microprogram. Once again we emphasize: There are no hard and fast rules about what must be in hardware and what must be in software.

When developing a multilevel machine, the designers must decide what to put in each level. This is a generalization of the problem mentioned earlier, of deciding what to put in the hardware and what to put in the software, the hardware merely being the lowest level. It is interesting to note some of the features of some modern computers that are now performed by the hardware or microprogram but that originally were explicitly programmed at the conventional machine level. They include:

1. Instructions for integer multiplication and division.
2. Floating-point arithmetic instructions (see Appendix B).
3. Double-precision arithmetic instructions (arithmetic on numbers with twice as many significant figures as usual).
4. Instructions for calling and returning from procedures.
5. Instructions for speeding up looping.
6. Instructions for counting (adding 1 to a variable).
7. Instructions for handling character strings.
8. Features to speed up computations involving arrays (indexing and indirect addressing).
9. Features to permit programs to be moved in memory after they have started running (relocation facilities).
10. Clocks for timing programs.
11. Interrupt systems that signal the computer as soon as an input or output operation is completed.
12. The ability to suspend one program and start another in a small number of instructions (process switching).

The point of this discussion is to show that the boundary between hardware and software is arbitrary and constantly changing. Today's software is tomorrow's hardware, and vice versa. Furthermore, the boundaries between the various levels are also fluid. From the programmer's point of view, how an instruction is actually implemented is unimportant (except perhaps for its speed). A person programming

at the conventional machine level can use its multiply instruction as though it were a hardware instruction without having to worry about it, or even be aware of whether it really is a hardware instruction or not. One person's hardware is another person's software.

The fact that a programmer need not be aware of how the level he is using is implemented leads to the idea of structured machine design. A level is often called a virtual machine because the programmer thinks of it as a real physical machine, even though it does not actually exist. By structuring a machine as a series of levels, programmers working on level  $n$  need not be aware of all the messy details of the underlying levels. This structuring enormously simplifies the production of complex (virtual) machines.

## 1.5. MILESTONES IN COMPUTER ARCHITECTURE

Hundreds of different kinds of computers have been designed and built during the evolution of the modern digital computer. Most have been long forgotten, but a few have had a significant impact on modern ideas. In this section we will give a brief sketch of some of the key historical developments, to get a better understanding of how we got where we are now. Needless to say, this section only touches on the highlights, and leaves many stones unturned. Figure 1-4 lists some of the milestone machines to be discussed in this section. Slater (1987) is a good place to look for additional historical material on the people who founded the computer age.

### 1.5.1. The Zeroth Generation—Mechanical Computers (1642-1945)

The first person to build a working calculating machine was the French scientist Blaise Pascal (1623-1662), in whose honor the programming language Pascal is named. This device, built in 1642, when Pascal was only 19, was designed to help his father, a tax collector for the French government. It was entirely mechanical, using gears, and powered by a hand operated crank.

Pascal's machine could only do addition and subtraction, but thirty years later the great German mathematician Baron Gottfried Wilhelm von Leibniz (1646-1716) built another mechanical machine that could multiply and divide as well. In effect, Leibniz had built the equivalent of a four-function pocket calculator three centuries ago.

Nothing much happened for 150 years until a professor of mathematics at the University of Cambridge, Charles Babbage (1792-1871), inventor of the speedometer, designed and built his difference engine. This mechanical device, which like Pascal's could only add and subtract, was designed to compute tables of numbers useful for naval navigation. The entire construction of the machine was designed to run a single algorithm, the method of finite differences using polynomials. The most interesting feature of the difference engine was its output method: it punched

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